

The penultimate whorl of *duplicatus* is wider in proportion to the last whorl than in *Sykesi*; the latter is also distinguished by its prominent inner basal ridge at the umbilical area.

*Cataulus marginatus*, Pf., var. *crenulata*, nov.

Slightly broader than typical *marginatus*, less strongly malleated, and lacking the distinctly margined suture of that species; of a light reddish colour, and crenulated at and below the suture of the middle whorls, the antepenultimate showing it more distinctly.

Maj. diam. 6; alt. 15 mm.

Loc. Ceylon.

*Cataulus Nevilli*, Sykes, var. *flaveolabris*, nov.

Lighter-coloured and with a yellow peristome, the latter being more on a plane with the spire than in typical *Nevilli*, which is generally somewhat produced forward at the basal portion.

Maj. diam. 11; alt. 25 mm.

Loc. Ceylon.

LV.—*Natural History Notes from H.M. Indian Marine Survey Steamer 'Investigator,' Commander T. H. Heming, R.N.—Series III., No. 1. On Mollusca from the Bay of Bengal and the Arabian Sea.* By EDGAR A. SMITH, I.S.O.

[Continued from vol. iv. p. 251.]

IN these 'Annals' for 1899, vol. iv. pp. 237–251, diagnoses were given of thirty-five new species from the collection about to be described. The publication of such lists as the following are of importance as regards our knowledge of both geographical and bathymetrical distribution. Many of the species were obtained at Stations 229, 232, and 233, the exact positions of which are as follows:—

Station 229.—Lat.  $9^{\circ} 29' 34''$  N., long.  $75^{\circ} 38'$  E.:  
360 fath.; green mud.

Station 232.—Lat.  $7^{\circ} 17' 30''$  N., long.  $76^{\circ} 51'$  E.:  
430 fath.; grey mud.

Station 233.—Lat.  $13^{\circ} 17' 15''$  N., long.  $93^{\circ} 10'$  E.:  
185 fath.; sand.

The thirty-five species already referred to have been figured in the "Illustrations of the Zoology of the 'Investigator,'" *Mollusca*, pls. ix.-xii. (1901). The sixteen new species now described will be figured in a future part of the same work.

*Conus planiliratus*, Sowerby.

*Conus planiliratus*, Smith, Ann. & Mag. Nat. Hist. 1894, vol. xiv. p. 159.

*Hab.* Coromandel coast, 12 fath.

*Conus Sowerbii*, Reeve.

*Conus sinensis* (Sowerby ?), Reeve, Conch. Icon. pl. xv. fig. 77 a.

*Conus Sowerbii*, Reeve, Conch. Icon., Suppl. Emend. p. 2.

*Hab.* Off Coromandel coast, in 41 fath.

*Conus turriculatus*, Sowerby.

*Conus turriculatus*, Smith, Ann. & Mag. Nat. Hist. 1894, vol. xiv. p. 160.

*Hab.* Off Mangalore, Malabar coast, 26-30 fath.

The largest specimen of this species in the Cuming Collection, hitherto confused with *C. Sowerbii*, is 35 mm. in length. This is rather larger than the type, and, judging from the thinness of the lip, it is scarcely adult.

*Conus semisulcatus*, Sowerby.

*Conus semisulcatus*, Sowerby, Proc. Zool. Soc. 1870, p. 257, pl. xxii. fig. 13; Thes. Conch. vol. v. p. 253, pl. 508. fig. 666 (bad!).

*Hab.* — ? (*Sowerby*); off Vizagapatam coast, 20 fath.

The type of this species in the collection of the British Museum is a young shell only 21 mm. in length. The more mature, possibly adult, examples from Vizagapatam, 33 mm. long, agree exactly with it in all other respects. The surface is clothed with a thin deciduous periostracum, which exhibits a few distant setose lines or ridges upon the body-whorl and is coarser and lamellated upon the spire, which has about five whorls succeeding the smooth glassy protoconch, finely coronated. The sulci upon the anterior end of the shell are about eleven in number.

*Conus aculeiformis*, Reeve.

*Conus aculeiformis*, Reeve, Conch. Icon. pl. xlv. fig. 240 b; Sowerby, Thes. Conch. vol. iii. pl. xvi. fig. 370.

*Hab.* Philippine Islands (*Reeve*); Holothuria Bank, N.W.

Australia, 15-30 fath. (Brit. Mus.); off Vizagapatam, 25 fath., off Coromandel coast, 41 fath., off Mangalore, 26-30 fath. ('Investigator').

The series of specimens from the above localities shows that the species varies somewhat in the strength of the sculpture and the depth of the coloration. The upper whorls of the spire may or may not be coronated. In the type they are strongly nodose, whilst in the specimens from N.W. Australia the coronation is almost obsolete, and in the examples from the Indian localities it is entirely absent. The transverse ridges upon the body-whorl are coarser and most prominent in the typical form and comparatively flattened in the Australian specimens. There are also other minor differences in the various examples which it would be tedious to explain in words, although they are quite apparent and interesting on comparison.

### *Conus Sieboldii*, Reeve.

*Conus Sieboldii*, Conch. Icon., Suppl. pl. i. fig. 269; Sowerby, Thes. Con. vol. iii. pl. ccii. fig. 369; Weinkauff, Conch.-Cab. ed. 2, p. 285, pl. xlix. fig. 6.

*Hab.* Japan (Reeve, Lischke, &c.); Stations 229 and 232, off Malabar, in 360 fath., and off Travancore coast, in 430 fath. ('Investigator').

Only one of the five specimens examined shows any traces of the scattered brownish blotches which are characteristic of this species. This absence of colour is not remarkable, as these examples were from deep water, probably much deeper than that whence any of the previously recorded specimens were obtained. It will be remembered that the occurrence of *Ranella (Biplex) perca*, a well-known Japanese form, has already been recorded from deep water off Colombo\*, and also the Japanese *Xenophora pallidula* from 188 fath. off the Andaman Islands†. It is therefore interesting to find another form hitherto supposed to be exclusively Japanese occurring in the Bay of Bengal.

The apex of the spire in these specimens, which were dredged alive, is eroded, so that the slight "coronation" of the whorls is destroyed. This would probably be the case in all specimens obtained at this particular station.

\* Smith, Ann. & Mag. Nat. Hist. 1895, vol. xvi. p. 6.

† Sowerby, Proc. Malac. Soc. vol. i. p. 38.

*Pleurotoma vagata*, Smith.

*Pleurotoma vagata*, Smith, Ann. & Mag. Nat. Hist. 1895, vol. xvi. p. 3, pl. i. fig. 3.

*Hab.* Station 233, off Andaman Islands, in 185 fath.; also Station 229, off the Travancore coast, in 360 fath.

The specimens from the first locality agree in every respect with the unique type from 200–350 fath. off Trincomalee. The infrasutural keel is generally somewhat reddish, and the central carina is spotted with the same colour between the tubercles, which in some specimens become obsolete upon the body-whorl. The concavity of the upper part of the whorls becomes more obvious as the shell increases, so that it forms a deep channel upon the body-whorl in some specimens. In the shells from off the Travancore coast the keel at the suture is much more feeble than in the typical form.

*Pleurotoma congener*, Smith.

*Pleurotoma congener*, Smith, Ann. & Mag. Nat. Hist. 1894, vol. xiv. p. 160, pl. iii. figs. 4, 5.

*Hab.* Station 229, off Travancore coast, in 360 fath.; also Station 233, off Andaman Islands, in 185 fath.

The specimens obtained off the Travancore coast are longer and narrower than the typical form, with a narrower tuberculated band round the middle of the whorls. Five out of the eight specimens examined, all dead and more or less broken, have the peculiar swelling on the upper part of the columella which was mentioned as occurring in some examples obtained off Colombo. The measurements of the largest specimen are:—

Length 62 mm., diam. 20; aperture 20 long, 8 wide.

*Pleurotoma optata*, Smith.

*Pleurotoma optata*, Smith, Ann. & Mag. Nat. Hist. 1899, vol. iv. p. 238; Illust. Zool. 'Investigator,' pl. ix. figs. 1, 1 a.

*Hab.* Station 232, off South India, 430 fath.; and Station 229, off Travancore in 360 fath.

*Pleurotoma fusca*, Hombron & Jacquinot, var.

*Pleurotoma fusca*, H. & J., Voy. Pôle Sud, p. 111, pl. xxv. figs. 19, 20.

*Hab.* Station 240, off Andaman Islands, 194 fath.

Two specimens, paler than the type, almost white, with a slightly shorter anterior canal. *Pl. gemmata*, Hinds, may be the same as this species, but the spire seems to be more

slender. *Pl. amabilis*, Weinkauff, is very closely allied, if not identical. Hinds's locality, "California," may yet be confirmed.

*Pleurotoma jubata*, Hinds.

*Pleurotoma jubata*, Hinds, Reeve, Conch. Icon. fig. 52.

*Hab.* Off Mangalore, Malabar coast, 26-30 fath.

One specimen, like the type, but with the beaded keel scarcely at all beaded.

*Pleurotoma acutigemmata*, var. *minor*.

*Pleurotoma acutigemmata*, Smith, Ann. & Mag. Nat. Hist. 1877, vol. xix. p. 489.

*Hab.* Off south coast of Ceylon, 34 fath.

A single specimen, only 13 mm. in length, like the type in form and colour, but with the gemmate keel almost smooth.

*Pleurotoma unedo*, Valenciennes.

*Pleurotoma unedo*, Valenciennes, Kiener, Coq. Viv. p. 19, pl. xiv. fig. 1; Reeve, Conch. Icon. fig. 12.

*Hab.* Eight miles south of Puri, 13 fath.

*Pleurotoma (Surcula) tornata* (Dillwyn).

*Surcula tornata*, Tryon, Man. Conch. vol. vi. p. 237, pl. v. fig. 62.

*Hab.* Same as preceding species.

*Pleurotoma (Surcula) symbiotes*, Wood-Mason & Alcock.

*Pleurotoma (Surcula) symbiotes*, Smith, Ann. & Mag. Nat. Hist. 1894, vol. xiv. p. 161, pl. iii. figs. 7, 8.

*Hab.* Station 233, off Andaman Islands, in 185 fath.

These specimens do not differ from the type, which was obtained in 1043 fath. off Southern India. Being in fresh condition they are coated all over with the very thin periostreaum mentioned in the description.

*Pleurotoma (Surcula) Thurstoni*, Smith.

*Pleurotoma (Surcula) Thurstoni*, Smith, Ann. & Mag. Nat. Hist. 1896, vol. xviii. p. 369.

*Hab.* Off Trincomalee, in 200-350 fath.; and Station 229, off Travancore coast, in 360 fath.

One specimen from the latter locality is larger than the type, being 55 mm. in length and 16 in width.

*Pleurotoma (Surcula) breviplicata*, Smith.

*Pleurotoma (Surcula) breviplicata*, Smith, Ann. & Mag. Nat. Hist. 1899, vol. iv. p. 238; Illust. Zool. 'Investigator,' pl. ix. figs. 3, 3 a.

*Hab.* Station 233, off Andaman Islands, in 185 fath.

*Pleurotoma (Surcula) eurina*, Smith.

*Pleurotoma (Surcula) eurina*, Smith, Ann. & Mag. Nat. Hist. 1899, vol. iv. p. 239; Illust. Zool. 'Investigator,' pl. ix. figs. 4, 4 a.

*Hab.* Station 232, off South India, in 430 fath.

*Pleurotoma (Surcula) præcipua*, Smith.

*Pleurotoma (Surcula) præcipua*, Smith, Ann. & Mag. Nat. Hist. 1899, vol. iv. p. 239; Illust. Zool. 'Investigator,' pl. ix. figs. 5, 5 a.

*Hab.* Station 229, off Travancore coast, in 360 fath.

*Pleurotoma (Surcula) arcana*, Smith.

*Pleurotoma (Surcula) arcana*, Smith, Ann. & Mag. Nat. Hist. 1899, vol. iv. p. 239; Illust. Zool. 'Investigator,' pl. ix. figs. 6, 6 a.

*Hab.* Station 233, off Andaman Islands, in 185 fath.; and Station 229, off Travancore coast, in 360 fath.

*Pleurotoma (Surcula) Margaritæ*, sp. n.

Testa fusiformis, turrita, albida, epidermide tenuissima lutescente induta; spira elongata, acuminata; anfractus 12, in medio angulati, nodose oblique plicati (plicis inferne attenuatis), supra concavi, infra subconvexi, undique spiraliter tenuiter et confertim striati lineisque incrementi flexuosis tenuibus sculpti, ultimus infra angulum convexus, antice breviter rostratus; apertura elongata, piriformis; labrum tenue, valde arcuatim prominens, superne late et profunde sinuatum; columella in medio rectiuscula, antice obliqua.

Longit. 60 mm., diam. 20; apertura cum canali 27 longa, 8 lata.

*Hab.* Off Andaman Islands, 405 fath.

In the body-whorl there is a slight convexity or rounded ridge just below the suture and above the excavation, below which occur the oblique nodose plications which gradually diminish in strength as the aperture is approached.

*Pleurotoma (Bathytoma) atractoides*, Watson.

*Pleurotoma (Genota) atractoides*, Watson, Gasteropoda 'Challenger' Expedition, p. 301, pl. xx. fig. 8 a-c.

*Bathytoma atractoides*, Harris, Cat. Austral. Ter. Moll. part i. p. 49.



*Hab.* Philippine Islands, 375 fath. ('Challenger'); Stations off Andaman Islands, 185-405 fath. ('Investigator'); in 188 fath. (*Sowerby*, P. Malac. Soc. i. p. 38).

The specimens from the Andaman Islands are perhaps a trifle shorter in proportion to their width than the type and have the transverse liræ upon the body-whorl more distinctly granose. A single oblique fold, not noticed by Watson, is present upon the middle of the columella. This is only visible when the outer lip is broken away. A very fine example from 405 fath. is much larger than the specimen obtained by the 'Challenger,' being 47 mm. in length and 20 in width. Three out of the four examples examined have a number of fine liræ within the outer lip, a feature not present in the 'Challenger' shell.

*P. Wetherelli*, Ed., of the London Clay, and the Miocene *P. cataphracta* are very closely allied forms.

From *P. Oldhami* this species differs in the absence of the channelled suture and the broad raised belt with a deep groove beneath it.

*Pleurotoma (Bathytoma) Oldhami*, Smith.

*Pleurotoma (Bathytoma) Oldhami*, Smith, Ann. & Mag. Nat. Hist. 1899, vol. iv. p. 238; Illust. Zool. 'Investigator,' pl. ix. figs. 2, 2 a.

*Hab.* Station 229, off Travancore coast, in 360 fath.

*Pleurotoma (Ancistrostrix) travancorica*, Smith,  
var. *granulata*.

*Pleurotoma (Ancistrostrix) travancorica*, Smith, Ann. & Mag. Nat. Hist. 1896, vol. xviii. p. 368; Illust. Zool. 'Investigator,' Mollusca, pl. vii. figs. 1, 1 a.

*Hab.* Station 229, off Travancore, in 360 fath.; Stations 233 and 240, off Andaman Islands, in 185-194 fath.

Three specimens from off Travancore differ from the type in having the lower part of the body-whorl covered with oblique rows of minute granules, also in having a spiral liration in the concavity of the whorls near the dentate keel. This liration bears small tubercles connected by short cross-ridges with the dentations of the keel. Two examples from the latter locality have the dentations at the angle of the whorls conspicuously upturned, so that the upper part of the volutions is deeply concave. The latter are twelve in number, of which the apical one is smooth and globular.

*Drillia investigatoris*, Smith.

*Drillia investigatoris*, Smith, Ann. & Mag. Nat. Hist. 1899, vol. iv. p. 240; Illust. Zool. 'Investigator,' pl. x. figs. 1, 1 a.

*Hab.* Station 233, off Andaman Islands, in 185 fath.

*Drillia fugata*, Smith.

*Drillia fugata*, Smith, Ann. & Mag. Nat. Hist. 1895, vol. xvi. p. 4, pl. i. figs. 5, 5 a.

*Hab.* Off Andaman Islands, in 405 fath.

A single specimen agreeing with the variety fig. 5 a.

*Drillia captiva*, Smith.

*Drillia captiva*, Smith, Ann. & Mag. Nat. Hist. 1899, vol. iv. p. 240; Illust. Zool. 'Investigator,' pl. x. fig. 2.

*Hab.* Station 233, off Andaman Islands, 185 fath.

*Drillia capta*, Smith.

*Drillia capta*, Smith, Ann. & Mag. Nat. Hist. 1899, vol. iv. p. 240; Illust. Zool. 'Investigator,' pl. x. fig. 3.

*Hab.* Station 233, off Andaman Islands, 185 fath.

*Drillia Worthingtoni*, sp. n.

Testa breviter fusiformis, fusciscenti-albida; anfractus 9, duo apicales læves, rotundati, cæteri superne excavati, infra nodose costati (costis in anfr. penult. 8-10) et transversim tenuissime striati, ultimus varice conspicuo rotundato ad sinistram instructo, inter varicem et labrum haud costatus; apertura parva; labrum tenue, supra late et subprofunde sinuatum; columella rectiuscula, callo tenui, supra prope sinum subnodoso, induta.

Longit. 16 mm., diam. 6; apertura 6 longa, 2 lata.

*Hab.* Station 240, off Andaman Islands, in 194 fath.; off Ross Island, 265 fath.

The lines of growth are fine and flexuous, and the fine spiral striae only occur upon the lower half of the whorls, the concavity above exhibiting only the sinuated incremental lines.

*Clathurella perlissa*, sp. n.

Testa ovato-fusiformis, nitida, fusciscentis, zona pallida infra suturam aliaque circa medium anfr. ultimi ornata; spira turrita, acuminata; anfractus 9, superiores 3, protoconcham constituentes, læves, primus convexus, duo sequentes infra medium carinati, cæteri (normales) supra decliviter excavati, infra convexi, circa



medium costati, costis bituberculatis, in anfr. penultimo 10, in ultimo labrum versus obsoletis haud infra medium productis, ultimus antice contractus et oblique striatus; apertura parva, contracta; labrum incrassatum, varicosum, album, ad suturam sinuatum, intus denticulis 7-8 instructum, sed supra marginem acutum minutius crenulatum; columella alba, serie tuberculorum minorum munita; canalis anterior obliquus, mediocriter angustatus.

Longit.  $11\frac{1}{2}$  mm., diam.  $5\frac{1}{2}$ ; apertura cum canali 6 longa, intus  $1\frac{1}{3}$  lata.

*Hab.* Station 237, off Andaman Islands, 90 fath.

A very pretty glossy species. The costæ are traversed by two spirals producing a tuberculated appearance. Of the very small tubercles upon the columella a few at the upper or posterior part are more prominent than the rest.

*Clathurella rugidentata* (Sowerby).

*Pleurotoma* (*Clathurella*?) *rugidentata*, Sowerby, Proc. Malac. Soc. vol. i. p. 38, pl. iv. fig. 11.

*Hab.* Station 240, off Andaman Islands, 194 fath. ('Investigator'); in 188 fath. (*Sowerby*).

Besides the oblique slender costæ and the fine spiral liræ, nodulous at the points of intersection, the surface exhibits fine spiral raised striæ in the interstices.

*Trophon tenuirostratus*, Smith.

*Trophon tenuirostratus*, Smith, Ann. & Mag. Nat. Hist. 1899, vol. iv. p. 241; Illust. Zool. 'Investigator,' pl. x. figs. 4, 4 a.

*Hab.* Station 233, off Andaman Islands, in 185 fath.

*Trophon indicus*, Smith.

*Trophon indicus*, Smith, Ann. & Mag. Nat. Hist. 1899, vol. iv. p. 241; Illust. Zool. 'Investigator,' pl. x. figs. 5, 5 a.

*Hab.* Station 233, off Andaman Islands, in 185 fath.

*Fusus captivus*, Smith.

*Fusus captivus*, Smith, Ann. & Mag. Nat. Hist. 1899, vol. iv. p. 242; Illust. Zool. 'Investigator,' pl. x. figs. 8, 8 a.

*Hab.* Station 233, off Andaman Islands, 185 fath.

*Murex ternispina*, Lamarck.

*Murex ternispina*, Lamk., Kiener, Icon. Coq. Viv. p. 6, pls. viii., ix., fig. 1.

*Hab.* Twenty-six miles W.S.W. of Honawar, west coast of

India, in 28 fath.; off Mangalore, in 26–30 fath.; off south coast of Ceylon, 34 fath.; Station 237, off Andaman Islands, 90 fath.

Some variation exists among the series of specimens from these localities; those from off Honawar have the principal spiral ridges dotted with red and only very slightly tuberculated, whereas the examples from off Ceylon exhibit more distinct tubercles and no dotting, but instead a very faint brownish or reddish zone around the base of the body-whorl. The apical portion of the spire is also more produced and the sculpture of the first three normal whorls rather different. They are more rounded and more finely cancellated.

*Murex Troscheli*, Lischke.

*Murex Troscheli*, Lischke, Jap. Meeres-Conch. i. p. 41, pl. i. figs. 1, 2; ii. pp. 29, 164.

*Hab.* Station 237, off Andaman Islands, 90 fath., stones.

The largest specimen is 110 mm. in length. This is small in comparison with the type from Nagasaki, yet the shell appears to be mature. The spines also are rather longer and more slender. The whorls are rufo-lineated, but the spines are more slender and longer than as shown in Lischke's figures. Pilsbry\* has pointed out a similar variation in Japanese specimens.

*Murex mindanaensis*, Sowerby.

*Murex mindanaensis*, Sowerby, Proc. Zool. Soc. 1840, p. 139.

*Murex mindanaensis*, id. Conch. Ill. fig. 92, sp. 17; Thesaurus, iv. pl. 381. fig. 21.

*Murex mindensis*, Reeve, Conch. Icon. fig. 78.

*Murex mindanensis*, Kobelt, Conch.-Cab. p. 111, pl. xxxiv. fig. 8.

*Hab.* Off Mangalore, Malabar coast, 26–30 fath.

One specimen only, rather young, 40 millim. in length. The type was originally described from the Philippine Islands.

*Murex avicornis*, Lamarck.

*Hab.* Station 237, off Andaman Islands, 90 fath.; off south coast of Ceylon, 34 fath.

The Andaman examples are quite typical, as represented by Kiener's figure (Icon. Coq. Viv. pl. xlii. figs. 2), but those from Ceylon have shorter spines and generally three instead of two nodulous costæ between the varices.

\* Cat. Marine Moll. Japan, p. 41.

*Murex aculeatus*, Lamarek.

*Hab.* Off south coast of Ceylon, 34 fath. ('Investigator'); Tizard Bank, China Sea, 20 fath. (H.M.S. 'Rambler,' in Brit. Mus.).

The specimens from the above localities more closely agree with Kiener's figure (Coq. Viv. pl. xxxix. figs. 3) than with the shell depicted by Reeve (Conch. Icon. vol. iii. fig. 60). They have a single intermediate tubercle or plication between the varices, and exhibit some transverse fine reddish lines, as shown in Kiener's figure. On the other hand, Reeve's shell has two intervening plicæ and only faint traces of the spiral lineation.

*Phos roseatus*, Hinds.

*Phos roseatus*, Hinds, Voy. 'Sulphur,' Zool. vol. ii. p. 38, pl. x. figs. 9, 10; Sowerby, Thesaurus, vol. iii. p. 90, pl. cexxi. figs. 1-3; Tryon, Man. Conch. vol. iii. p. 217, pl. lxxxiii. figs. 508-9.

*Hab.* Off south coast of Ceylon, 34 fath.

A more slender and more finely sculptured form than that figured by Tryon and Sowerby. The species occurs at Sumatra, the Philippines, Moluccas, &c.

*Nassaria suturalis* (A. Adams).

*Hindsia suturalis*, A. Adams, Proc. Zool. Soc. 1853, p. 183; Kobelt, Conch.-Cab., *Purpuracea*, p. 318, pl. lxxvii. figs. 11, 12.

*Nassaria suturalis*, Sowerby, Thes. Conch. vol. iii. p. 86, pl. cexx. figs. 15, 16; Tryon, Man. Conch. vol. iii. p. 221, fig. 542 (*acuminata*, part.).

*Hab.* Off south coast of Ceylon, 34 fath., and eight miles south of Puri, Bengal, 13 fath. ('Investigator'); Malacca (*A. Ad.*); Ceylon (*Layard*).

*N. bitubercularis*, A. Adams, from Sorsogon, Philippine Islands, is a synonym.

*Nassaria nodicostata* (A. Adams).

*Hindsia nodicostata*, A. Adams, Proc. Zool. Soc. 1853, p. 183; Kobelt, Conch.-Cab., *Purpuracea*, p. 322, pl. lxxvii. fig. 13.

*Nassaria nodicostata*, Sowerby, Thes. Conch. vol. iii. p. 86, pl. cexx. fig. 13.

*Hab.* Station 239, off Andaman Islands, in 55 fath. ('Investigator'); —? (*A. Adams*).

This so-called species is probably only a small variety of *N. acuminata*, Reeve, from China, with which it has been united by Tryon \* together with half a dozen other species.

\* Man. Conch. vol. iii. p. 221, fig. 545.

*Nassaria nivea* (Gmelin).*Buccinum niveum*, Gmelin, Syst. Nat. p. 3495, non p. 3504.*Triton niveus*, Reeve, Conch. Icon. vol. ii. sp. 75.*Hab.* Gulf of Martaban, 6–100 fath., and off Vizagapatam coast, 20 fath.

Found also at Tranquebar, Malacca, Ceylon, &amp;c.

*Nassaria levior*, Smith.*Nassaria levior*, Smith, Ann. & Mag. Nat. Hist. 1899, vol. iv. p. 242 ;

Illust. Zool. 'Investigator,' pl. x. figs. 6, 6 a.

*Hab.* Station 237, off Andaman Islands, 90 fath.*Nassa gemmulata*, var.*Buccinum gemmulatum*, Lamarck, Kiener, Icon. Coq. Viv. p. 85, pl. xxii. fig. 84.*Nassa gemmulata*, Reeve, Conch. Icon. vol. viii. fig. 29.Var. = *N. variegata*, A. Adams, Reeve, l. c. fig. 70.*Hab.* Off Mangalore, Malabar coast, 26–30 fath.

The specimens from the above locality belong to the small finely granose form of this species named *variegata* by A. Adams. *Buccinum conoidale*, Deshayes, also, as suggested by Tryon, appears to belong to this species. *N. verrucosa*, A. Adams, is another variety.

*Nassa crenulata* (Bruguière).*Nassa crenulata*, Bruguière, Reeve, Conch. Icon. vol. viii. figs. 2 a, 2 b.*Hab.* Lat. 13° 17' N., long. 93° 7' E., off Andaman Islands, 90 fath.*Nassa aracanensis*, Smith.*Nassa aracanensis*, Smith, Ann. & Mag. Nat. Hist. 1899, vol. iv. p. 243 ;

Illust. Zool. 'Investigator,' pl. xi. figs. 2, 2 a.

*Hab.* Reef Island, Kyuk Phyon, off Aracan coast.*Nassa diluta*, Smith.*Nassa diluta*, Smith, Ann. & Mag. Nat. Hist. 1899, vol. iv. p. 243 ;

Illust. Zool. 'Investigator,' pl. xi. figs. 3, 3 a.

*Hab.* Off Colombo, 597 fath. ; also off Kistna coast, 753 fath.*Metula Hindsii*, H. & A. Adams.*Buccinum metula*, Hinds, Voy. 'Sulphur,' p. 31, pl. xvi. figs. 13, 14

Tryon, Mau. Conch. vol. iii. p. 153, pl. lxxii. fig. 240.

*Buccinum mitrella*, Adams & Reeve, Voy. 'Samarang,' Zool., Moll. p. 32, pl. xi. fig. 13; Tryon, *op. cit.* p. 152, pl. lxxii. fig. 239 (as *Metula*).

*Hab.* Off Coromandel coast, 41 fath.

*Buccinum mitrella* was originally described from the China Sea. The single specimen obtained by the 'Investigator' is larger than the type, being 24 mm. in length and 7 in width. The whorls also are slightly more convex. A feature not referred to in the description is the presence of varices at intervals up the spire, being merely the slightly thickened former outer lips of the aperture.

A careful examination of the description and figures given by Hinds of his *Buccinum metula* and a comparison of specimens in the Cuming collection apparently indicate that that species and *Buccinum mitrella* belong to the same form, differing only in size. The examples of *B. metula* in the British Museum are quite as small as that figured in the 'Sulphur,' and, with the exception of size, are undistinguishable from the larger form *mitrella*. Hinds's locality, "West coast of Veragua," may be an error.

*Tritonidea delicata*, Smith.

*Tritonidea delicata*, Smith, Ann. & Mag. Nat. Hist. 1899, vol. iv. p. 242; Illust. Zool. 'Investigator,' pl. x. figs. 7, 7 a.

*Hab.* Station 237, off Andaman Islands, 90 fath.

*Pisania angusta*, Smith.

*Pisania angusta*, Smith, Ann. & Mag. Nat. Hist. 1899, vol. iv. p. 243; Illust. Zool. 'Investigator,' pl. xi. figs. 1, 1 a.

*Hab.* Off south coast of Ceylon, 34 fath.

*Columbella (Mitrella) supraplicata*, Smith.

*Columbella (Mitrella) supraplicata*, Smith, Ann. & Mag. Nat. Hist. 1899, vol. iv. p. 244; Illust. Zool. 'Investigator,' pl. xi. figs. 7, 7 a.

*Hab.* Station 232, off Travancore coast, in 430 fath.

*Columbella (Meta) philippinarum*, Reeve.

*Hab.* Station 237, off Andaman Islands, 90 fath. ('Investigator'); Philippine Islands (*Reeve*); N. Borneo (*Ussher* & *Everett*, in Brit. Mus.).

The 'Investigator' specimens, coming from deep water, have lost almost all the colour-markings which usually are present in this species. They are dirty white, with just

feeble traces of brown zigzag lines and wavy longitudinal lineation. Two specimens in the Museum collection, collected in shallow water at the Andamans by Lieut. A. W. King and Capt. Francis Hamilton, have much brighter markings.

*Latiaxis diadema* (A. Adams).

*Murex diadema*, A. Adams, Proc. Zool. Soc. 1853, p. 70.

*Latiaxis diadema*, Sowerby, Thes. Conch. vol. v. p. 2, pl. ccccxiv. fig. 11.

*Hab.* Off south coast of Ceylon, 34 fath. ('Investigator'); Philippines (*A. Ad.*); Mauritius (*Robillard*, in Brit. Mus.).

The type of this species has been so overcleaned that the very beautiful transverse sculpture is almost obliterated. It consists of very numerous fine liræ, which are minutely squamose and undulating. The two specimens from Ceylon are of a delicate rose tint within the aperture and have a series of flattened hollow spines upon the lower angle of the body-whorl. They do not curve upwards like those above, but stand out horizontally. The columella is coated with an erect pink callus which unites with the labrum above.

A specimen from Mauritius obtained by the late Victor Robillard is larger than the typical form and differs also in being totally white, and the second keel upon the body-whorl is ornamented with very numerous hollow, short, somewhat upcurved spines. Also between this series and the squamose crest at the base there is another series of smaller scale-like spines. The fine, delicate, transverse sculpture which covers the entire surface is of the same character as in the other examples.

Length 36 mm.

19. *Coralliophila indica*, Smith.

*Coralliophila indica*, Smith, Ann. & Mag. Nat. Hist. 1899, vol. iv. p. 244; Illust. Zool. 'Investigator,' pl. xi. figs. 8, 8 a.

*Hab.* Station 232, off South India, 430 fath.

*Cancellaria trigonostoma*, Lamarck.

*Hab.* Off Coromandel coast, in 41 fath.

The single small example differs from the typical form in having more distinct longitudinal plicæ and finer spiral striæ, the surface of the body-whorl being minutely reticulated. It consists of four normal and two and a half apical whorls, the latter being smooth and convex.



*Cancellaria paucicostata*, Sowerby.

*Cancellaria paucicostata*, Sowerby, Proc. Malac. Soc. vol. i. p. 160, pl. xii. fig. 26.

Testa angulatim ovata, imperforata, dilute fuscescens, oblique costata et transversim tenuiter subgranose lirata; anfractus 5, celeriter crescentes, supremi duo læves, convexi, tertius cancellatus, penult. costis circiter 16 instructus, ultimus supra medium obtuse angulatus, costis circa 8-10 sensim magis distantibus ornatus; apertura irregulariter triangularis, alba, longit. totius  $\frac{1}{2}$  superans, antice leviter canaliculata; labrum incrassatum, intus tenuiter liratum; columella arcuata, triplicata, callo tenui induta. Longit. 17 mm., diam. 13, apertura 10 longa, 7 lata.

*Hab.* Off south coast of Ceylon, 34 fath. ('Investigator'); Persian Gulf (*Sowerby*).

The transverse liræ are very fine and alternately larger and smaller, and, being crossed by the lines of growth, have a very pretty subgranose appearance.

The type of this species in the British Museum is of a very pale reddish tint with a narrow whitish line round the middle of the body-whorl and another at the angulation above. In the Ceylonese specimen these pale zones are only just traceable. The liræ within the labrum are about seventeen in number.

*Cancellaria cretacea*, Smith.

*Cancellaria cretacea*, Smith, Ann. & Mag. Nat. Hist. 1899, vol. iv. p. 245; Illust. Zool. 'Investigator,' pl. xi. figs. 5, 5 a.

*Hab.* Station 229, off Travancore coast, in 360 fath.

*Ancilla leucospira*, Smith.

*Ancilla leucospira*, Smith, Ann. & Mag. Nat. Hist. 1899, vol. iv. p. 245; Illust. Zool. 'Investigator,' pl. xi. figs. 4, 4 a.

*Hab.* Station 240, lat.  $11^{\circ} 32'$  N., long.  $92^{\circ} 46'$  E., off Andaman Islands, 194 fath.

*Ancilla glans*, Smith.

*Ancilla glans*, Smith, Ann. & Mag. Nat. Hist. 1899, vol. iv. p. 246; Illust. Zool. 'Investigator,' pl. xi. figs. 6, 6 a.

*Hab.* Station 233, off Andaman Islands, 185 fath.

*Ancilla Tindalli*, Melvill.

*Ancilla Tindalli*, Melvill, Mem. & Proc. Manchester Lit. & Phil. Soc. 1898, vol. xlii. pt. ii. p. 14, pl. i. fig. 1.

*Hab.* Off south coast of Ceylon, 34 fath.

A single example agreeing in all respects with the type from the Angrias Bank, west of Bombay.

*Marginella angustata*, Sowerby.

*Hab.* Off Coromandel coast, 41 fath.

The specimens from this locality are much smaller than the types figured by Sowerby, the average length being only 13-14 mm. They differ also in exhibiting a small spire consisting of a few whorls, which, in the large form, becomes concealed by callus.

*Marginella grisea* (Jousseaume).

*Persicula grisea*, Jousseaume, Rev. Mag. Zool. 1875, p. 268.

*Marginella obtusa*, Sowerby, Proc. Zool. Soc. 1870, p. 254; non *M. obtusa*, Sow., 1846.

*Marginella sexplicata*, Dunker, ubi?; Weinkauff, Conch.-Cab. ed. 2, p. 85, pl. xvi. figs. 6, 7.

*Hab.* Gulf of Martaban, 67 fath.

It seems to me doubtful whether the shell figured by Weinkauff is the same species as that described by Sowerby. The type of *obtusa* in the British Museum is much larger (24 mm.) and narrower, has a flatter spire, and the plicæ on the columella seem different. I have been unable to find any reference to this species by Dunker before the year 1882 in his 'Index Moll. Maris Japon.' p. 57. The quotation by Weinkauff "Mus. Godeffr. Cat. 3 (1871)" is evidently erroneous, as that Catalogue was issued in 1866. Tryon, in his monograph of this species (Man. Conch. vol. v.), has merely followed Weinkauff, giving the same reference to the Godeffroy Catalogue; and Pilsbry also (Cat. Marine Moll. Japan, p. 24) throws no light upon the point.

*Turritella fascialis*, Menke.

*Turritella fascialis*, Menke, Kobelt, Conch.-Cab. ed. 2, p. 13, pl. iv. fig. 5.

*Hab.* Off south coast of Ceylon, 34 fath.

Undistinguishable from Japanese examples.

*Turritella columnaris*, Kiener.

*Turritella columnaris*, Kiener, Kobelt, *op. cit.* p. 48, pl. v. figs. 1, 2.

*Hab.* Off Mangalore, Malabar coast, 26-30 fath.

*Strombus Listeri*, T. Gray.

*Buccinum Bilingue canadense*, Lister, Hist. Conch. pl. 855. fig. 12 a.

*Strombus Listeri*, T. Gray, Ann. & Mag. Nat. Hist. 1852, vol. x. p. 430; Tryon, Man. Conch. vol. vii. p. 114, pl. iv. fig. 45.

*Strombus mirabilis*, Sowerby, Proc. Zool. Soc. 1870, p. 257, pl. xxi. fig. 4.

*Hab.* Ceylon (*Sowerby*); Gulf of Martaban, in 67 fath. ('Investigator').

Only two young examples were obtained by the 'Investigator,' but the record of another locality is interesting. They consist of ten normal and three nuclear whorls, the latter being globose, smooth, and glossy. At this age, before the last whorl is formed, the shell is fusiform and the columella almost straight. The ground-colour is white, variegated with numerous undulating, somewhat zigzag, brown flames. The last whorl is obliquely grooved upon the lower or anterior part.

*Strombus Sibbaldi*, Sowerby.

*Strombus Sibbaldi*, Sowerby, Thesaurus Conch. vol. i. p. 23, pl. vi. figs. 10, 11; Reeve, Conch. Icon. vol. vi. pl. xviii. fig. 48.

*Hab.* Off south coast of Ceylon, 34 fath.; also off Coromandel coast, 41 fath.

A small, but apparently adult, shell from the latter locality is destitute of colour-marking, and only 27 mm. in length.

*Rostellaria Powisii*, Petit.

*Rostellaria Powisii*, Petit, Mag. de Zool. 1842, pl. liii.

*Hab.* China (*Petit* and others); Gulf of Martaban, in 67 fath. ('Investigator').

This species, which is figured in the monographs by Sowerby, Reeve, Kiener, Küster, and Tryon, appears to have hitherto been recorded from China only. Its occurrence in the Indian Ocean is therefore of some interest.

*Xenophora (Haliphæbus) solaris* (Linn.).

*Hab.* Off Ganjam coast, in 28-30 fath. ('Investigator'); Coromandel and Nicobars (*Chemnitz*); Malacca (*Cuming*).

*Xenophora pallidula*, Reeve.

*Hab.* Off Andaman Islands, in 185 fath., and off Tavaneore coast in 360 fath. ('Investigator'); Japan (*Reeve*, &c.)

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*Pirula gracilis*, Sowerby.*Pirula gracilis*, Sowerby, Smith, Journ. Malacol. vol. iii. p. 67.*Pirula Dussumieri*, Kiener, Smith, Ann. & Mag. Nat. Hist. 1894, vol. xiv. p. 164.*Hab.* China Sea (Kiener, &c.); Station 69, in 20 fath. ('Investigator').*Ranella (Biplex) perca* (Perry).*Hab.* Station 240, off Andaman Islands, 194 fath.*Ranella bituberculata*, Lamarck.*Hab.* Off Mangalore, Malabar coast, 26-30 fath.*Distortrix cancellinus* (Roissy).*Hab.* Station 237, off Andaman Islands, 90 fath.; off Ganjam coast, 28-30 fath.; also 8 miles south of Puri, 13 fath.*Lotorium tripus*, Lamarck.*Hab.* Off south coast of Ceylon, 34 fath.; also off Malabar coast, 28 fath.*Ocula bullata*, Adams & Reeve.*Ovulum bullatum*, Adams & Reeve, Voy. 'Samarang,' Moll. p. 23, pl. vi. figs. 13 *a*, *b*; Reeve, Conch. Icon. vol. xv. pl. vi. figs. 26 *a*, *b*; Sowerby, Thesaurus, vol. ii. pl. ci. figs. 95, 96; Weinkauff, Conch.-Cab. ed. 2, p. 187, pl. xlvi. figs. 5 & 8.*Calpurnus bullatus*, A. Adams, Journ. Linn. Soc., Zool. 1864, vol. vii. p. 95.*Hab.* Off south coast of Ceylon, 34 fath. ('Investigator'); Singapore (*Ad.* & *Reeve*); Japan (*A. Ad.*).

Two specimens exactly like the type, the larger being 10½ mm. in length.

*Radius Angasi* (Reeve).*Ovulum Angasi* (Adams MSS.), Reeve, Conch. Icon. vol. xv. pl. x. figs. 43 *a-b*.*Hab.* Off south coast of Ceylon, in 34 fath. ('Investigator'); Port Curtis, Queensland (*Reeve*).

Two specimens of a very pale rose tint, with the two extremities tipped with brown. The latter feature is faintly present in the type, although not referred to by Reeve. Both the anterior and posterior ends are obliquely striated dorsally. The ventral part of the body-whorl is rather more humpy in the Australian form than in those from Ceylon.

*Trivia producta* (Gaskoin).

*Cypræa producta*, Gaskoin, Reeve, Conch. Icon. vol. iii. pl. xxiv. figs. 137 *a*, *b*; Sowerby, Thes. Conch. vol. iv. p. 49, pl. 327. figs. 495, 496.

*Hab.* Off Coromandel coast, 41 fath. ('Investigator'); Agulhas Bank, S. Africa (*Sowerby*); Red Sea (*Weinkauff*); Borneo, Australia (*Tryon*).

*Trivia pisum* (Gaskoin).

*Cypræa pisum*, Gaskoin, Sowerby, *op. cit.* p. 44, pl. 326. figs. 448, 449.

*Hab.* Off south coast of Ceylon, 34 fath.

*Scala Kieneri* (Canefri).

*Cirsotrema Kieneri*, Canefri, Journ. de Conch. 1876, p. 155.

*Scalaria decussata*, Kiener, non Lamarck, Icon. Coq. Viv. p. 21, pl. vii. fig. 23; Sowerby, Thes. Conch. vol. i. p. 103, pl. xxxv. fig. 140.

*Amæa Sowerbyi*, Dunker, Index Moll. Mar. Jap. p. 69.

*Scala fimbriolata*, Melvill, Mon. Manchester Phil. Soc. 1897, vol. xli. p. 11; vol. xlii. pl. i. fig. 12.

*Hab.* Off south coast of Ceylon, 34 fath. ('Investigator'); other localities are:—Arabia (*Sowerby*); Japan (*A. Adams*, *Dunker*, *Pilsbry*); Mekran coast (*Melvill*); Darnley Island, N. Australia (*Mus. Cuming*).

I am inclined to believe that *Tryon* is right in considering the *S. decussata* of Sowerby the same as that figured by Kiener under that name. After carefully comparing the type of *S. fimbriolata*, a young shell, with this species, I have failed to find any distinguishing characters.

The shell described by Clessin\* as a new species, under the name of *S. Sowerbyi*, is quite distinct from the present form.

*Scala multiperforata* (Sowerby).

*Scalaria multiperforata*, Sowerby, Conch. Icon. vol. xix. pl. xvi. fig. 125.

*Hab.* Off south coast of Ceylon, 34 fath. ('Investigator'); Mauritius (*Sowerby*).

A single large dead specimen, 40 mm. in length. It is doubtful whether this species is separable from *S. cochlea*, Sowerby, said to be from West Africa.

*Scala subcasta* (Smith).

*Scalaria subcasta*, Smith, Ann. & Mag. Nat. Hist. 1899, vol. iv. p. 246; Illust. Zool. 'Investigator,' pl. xii. figs. 2, 2 *a*.

*Hab.* Station 232, off Travancore coast, 430 fath.

\* Conch.-Cab. ed. 2, p. 63, pl. xv. fig. 1.

*Scala bengalensis* (Smith).

*Scaloria bengalensis*, Smith, Ann. & Mag. Nat. Hist. 1899, vol. iv. p. 246; Illust. Zool. 'Investigator,' pl. xii. figs. 1, 1 a.

*Hab.* Station 229, off Travancore coast, in 360 fath.

*Lacuna indica*, Smith.

*Lacuna indica*, Smith, Ann. & Mag. Nat. Hist. 1894, vol. xiv. p. 165, pl. iv. fig. 7.

*Hab.* Off Kistna coast, 753 fath.

The shell is white beneath an excessively thin deciduous epidermis, which produces the "sordide albida" appearance, as described in the original diagnosis.

*Lacuna globosa*, sp. n.

Testa globosa, tenuis, anguste umbilicata, pellucido-alba, periostraco-tenuissimo induta, limo rufescente sæpe inerustata, lineis incrementi sculpta; anfractus quatuor, celeriter accrescentes, perconvexi, ultimus antice oblique descendens, inferne circa umbilicum carina prominente gracili instructus; apertura irregulariter rotundata; peristoma tenue, continuum, margine externo infra late sed haud profunde sinuato, columellari in medio leviter reflexo et sinuato; operculum corneum, paucispirale, anfractibus 3-4 constructum.

Diam. maj. 5 mm., min. 4, alt. 5.

*Hab.* Station 212, in 111 fath.

Within the aperture a narrow and shallow groove corresponds with the external umbilical keel. Just above the termination of the latter the peristome exhibits a broad but shallow sinus. I regret being unable at present to give the position of Station 212.

*Natica rufa*, Born.

*Natica rufa*, Smith, Ann. & Mag. Nat. Hist. 1894, vol. xiv. p. 165, pl. iv. figs. 14, 14 a.

*Hab.* Bay of Bengal, 65 fath.

A single specimen with rather higher spire than usual.

*Natica violacea*, Sowerby.

*Natica violacea*, Philippi, Con.-Cab. ed. 2, p. 66 bis, pl. x. fig. 13.

*Hab.* Off Andaman Islands, 15 fath. ('Investigator'); other localities are Philippines, Fiji, Mauritius.

No description of the operculum appears to have been



published, excepting that Sowerby, in the original diagnosis\*, mentions that it is testaceous. It is white, glossy, and slightly concave externally, with a groove and a ridge parallel with the outer curved margin, whilst the straight or columellar side is finely serrate. Parallel with the curved outline may be noticed numerous faint subpellucid lines which arise between the denticles on the serrated edge.

[To be continued.]

#### BIBLIOGRAPHICAL NOTICES.

*Memoirs of the Geological Survey of the United Kingdom.—The Cretaceous Rocks of Britain.* Vol. III. *The Upper Chalk of England.* By A. J. JUKES-BROWNE. With Contributions by WILLIAM HILL, F.G.S. Svo. Pp. x and 566. With 79 Illustrations in the text and 1 Plate. 1904. E. Stanford, London; J. Menzies, Edinburgh; and Hodges & Co., Dublin. Price 10s.

As in the case of Vol. II. of this work (noticed in the Ann. & Mag. Nat. Hist. for February 1904), the Board of Agriculture and Fisheries, desirous that agriculturalists and others should have full benefit, has distributed this volume also for review.

The Memoirs of the Geological Survey of the United Kingdom always bring together much valuable material, and this volume is in no way wanting in this respect. The Upper Chalk is defined by the authors as consisting of the zones of *Holaster planus*, *Micraster cor-testudinarium*, *Micraster cor-anguinum*, *Marsupites*, *Actinocamax quadratus*, *Belemnitella mucronata*, and *Ostrea lunata*. The zonal divisions of the Chalk are fully recognized in this volume, although the authors seem reluctant to part with the obsolete divisions of "Upper," "Middle," and "Lower," which have now such small significance. They also seem to hanker after a fresh system of zonal nomenclature (p. 5), but this seems to us to be unnecessary. In the descriptions of the coast-sections full credit is given to Dr. Rowe, who must certainly feel rewarded in reading the generous tribute to his work in the Preface by the Director. Indeed it is quite clear, and is so stated (p. 38), that the publication of Messrs. Rowe and Sherborn's work necessitated the re-writing of those parts of this Memoir which deal with the districts that they have examined; and this is the more clearly brought out at pp. 275-278 ("Yorkshire"), if anyone will take the trouble to compare the official account with that recently published by Dr. Rowe in the 'Proceedings' of the Geologists' Association. It is more and more evident that future work in the field must be conducted by those who have more than a working knowledge of the zoology of the beds which they are surveying, as the exactitude of results achieved

\* Tankerville Cat. p. xi.